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ORAL AND MAXILLOFACIAL SURGERY CLINICS

Postoperative management of the obstructive sleep apnea patient

Kasey K. Li, MD, DDS*, Nelson Powell, MD, DDS, Robert Riley, MD, DDS

Center for Excellence in Sleep Disorders Medicine, Stanford University Medical School, 401 Quarry Road Stanford, CA 94305, USA

It is now well accepted that disproportionate anatomy of the upper airway exists in obstructive sleep apnea (OSA), which leads to obstruction during sleep [1–3]. Recognizing that most patients with OSA have more than one site of obstruction in the upper airway, modern surgical approach for the treatment of OSA focuses on multiple sites in the upper airway, including the nose, palate (pharynx), and base of tongue (hypopharynx) [4,5]. Although this treatment approach has achieved a higher cure rate, the risk of postoperative airway compromise may be increased owing to surgically induced edema in multiple regions. In addition to the surgically induced edema, muscle atonia and altered respiration due to general anesthesia and narcotic use further increase the risk in these patients who already have a compromised airway. Indeed, acute airway obstruction after the use of sedatives has been reported in patients with OSA [6,7].

On the basis of a national survey, Fairbanks [8] reported 16 postoperative deaths and 7 near-death incidences after OSA surgery. The most common causes of these catastrophic complications were oversedation and surgical edema. In a retrospective review of 135 patients who had OSA surgery, Esclamando and colleagues [9] identified many complications including death, failed intubation, airway obstruction after extubation, hemorrhage, and arrhythmia. Indeed, patients undergoing OSA surgery often have comorbid issues, especially cardiovascular disease, which can complicate treatment. Based on a retrospective review of 182 patients who had OSA surgery, Riley et al [10] identified 31% (56 patients) with hypertension, 5.5% (10 patients) with arrhythmia, and 3.3% (6 patients) with a history of myocardial infarction.

Clearly, many factors can complicate the postoperative management of OSA patients. It is imperative for the sleep surgeon to take necessary precautions to minimize complications. To ensure patient safety, a surgical risk-management protocol was developed at our center in 1988, which included ICU monitoring on the first postoperative day, the use of nasal continuous positive airway pressure (CPAP) for airway protection during sleep and after discharge, aggressive hypertension management, and a criterion for the administration of analgesics. In recent years, this protocol has been revised to include preoperative and postoperative fiberoptic airway evaluation.

The Stanford risk management protocol

Nasal CPAP

The prevention of airway complication is of utmost importance. Therefore, we use nasal CPAP extensively in this protocol for airway protection [11]. Nasal CPAP should be attempted at least 2 weeks before surgery to reverse sleep debt. Nasal CPAP should be readily available at all times during the hospitalization. We routinely place the nasal CPAP immediately after surgery, not only while the patient is asleep but also during wakefulness to minimize edema formation and prevent REM rebound in the postoperative period.

* Corresponding author. 750 Welch Road, Suite 317, Palo Alto, CA, USA.

Email-address: kaseyli@hotmail.com (K.K. Li).

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All patients are maintained on humidified oxygen (35%) by a fact tent. Oximetry is monitored throughout the hospitalization. In patients who cannot tolerate short-term nasal CPAP use, home oxygen after discharge is often prescribed in those with a respiratory disturbance index (RDI) greater than or equal to 40 and oxygen desaturation of 80% or less.

Tracheotomy

Temporary tracheotomy is considered in patients who have a difficult airway, such as with the presence of severe OSA (RDI > 60 and Sa_{O_2} < 60), morbid obesity, or significant craniofacial abnormality.

Intubation/extubation

All patients are induced and intubated with the surgeon present. A fiberoptic intubation with the patient awake is performed if there are any concerns about the airway based on the craniofacial anatomy, body habitus, the severity of OSA, or preoperative fiberoptic airway examination. At the completion of the surgery, wakefulness is confirmed in all patients by the ability to follow commands. All patients are extubated in the operating room.

ICU utilization

ICU stay is routine in patients with significant comorbid factors such as cardiovascular problems and in patients undergoing multiple procedures such as combining uvulopalatoplasty and genioglossus advancement. This practice maximizes our ability to detect any respiration abnormality, oversedation, or excessive airway edema.

Furthermore, hypertension is aggressively treated with intravenous antihypertensive medications to minimize edema development. If necessary, blood pressure monitoring by arterial line is used.

On the first postoperative day, all patient are evaluated before transfer to the ward. Obviously, transfer is delayed if there are any concerns of excessive airway edema.

Analgesic use

Intravenous analgesics such as morphine sulfate or meperidine HCl are used in the ICU. Intravenous medications are administered in graduated doses by the nursing staff (eg, morphine sulfate, 1 to 8 mg every 1 to 2 hours as necessary) while the signs for oversedation are monitored. The nursing and ICU staffs are educated regarding the mechanism of OSA, the use of narcotics, and the different OSA procedures performed through semiannual lectures. Finally, patient-controlled analgesia is not used because of the possibility of oversedation.

Upon transfer to the ward on the first postoperative day, intramuscular meperidine HCl and oxycodone elixir are used. Oral hydrocodone is used after discharge.

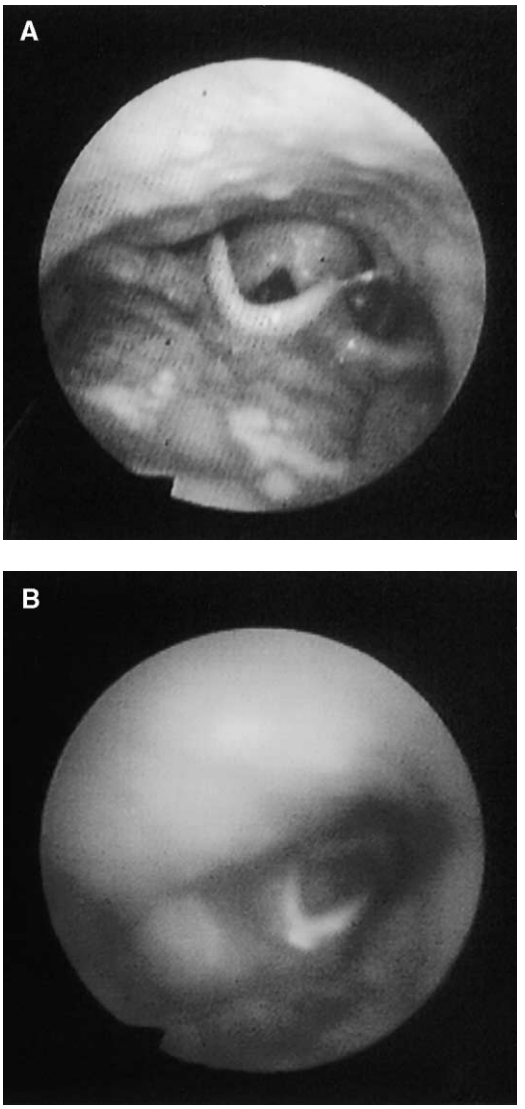

Fig. 1. (A) Fiberoptic view prior to UPPP/tonsillectomy/GA. (B) Fiberoptic view at 48 hours after surgery. Note the airway obstruction due to soft palate/pharyngeal edema. (*From* Li KK, Riley RW, Powell NB, Zonato A. Fiberoptic nasopharyngoscopy for airway monitoring following obstructive sleep apnea surgery. J Oral Maxillofac Surg 2000; 58:1342–5; with permission.)

Discharge/fiberoptic examination

The requirements for discharge are adequate oral intake, satisfactory pain control, and stable airway; however, airway compromise remains a concern after discharge, as it can occur 36 hours after surgery [8,12]. Therefore, we now routinely examine the patient's airway with a fiberoptic scope before discharge [13,14]. Based on a review of 271 patients who had postoperative fiberoptic airway examination during a 24-month period, we have increased our understanding of the postsurgical edema patterns. It was apparent that varying degrees of soft tissue edema involving the soft palate and tongue base occurred in all of the patients who underwent uvulopalatoplasty and genioglossus advancement or hyoid myotomy. Patients who had tonsillectomies combined with uvulopalatopharyngoplasty had a greater soft palate/pharyngeal wall edema compared to patients without tonsillectomies (Fig.1) [13]. Interestingly, a different edema pattern was noted in the patients after maxillomandibular advancement (MMA), with varying degrees of lateral pharyngeal wall edema identified. Furthermore, hypopharyngeal hematoma involving the pyriform sinus, aryepiglottic fold, arytenoid, and false vocal cord that partially obstructed the airway have been noted (Fig. 2).

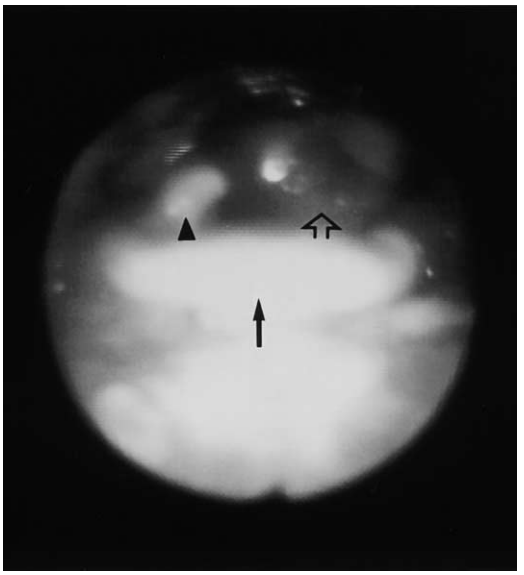

Fig. 2. Unilateral hematoma obscuring the left arytenoid (*open arrow*). Note the right arytenoid (*arrowhead*) and the epiglottis (*arrow*). (*From* Li KK, Riley RW, Powell NB, Zonato A. Fiberoptic nasopharyngoscopy for airway monitoring following obstructive sleep apnea surgery. J Oral Maxillofac Surg 2000; 58:1342–5; with permission.)

Conclusion

The postoperative care of the OSA patient presents a formidable challenge to the sleep surgeon. In addition to all of the comorbid issues that are commonly found, edema is an unavoidable process after surgery, and postoperative airway edema in patients with an already compromised airway presents a major concern. Johnson and Sanders [12] and Burgess and colleagues [15] found that the respiratory disturbance index and the nadir oxygenation saturation may be adversely affected after uvulopalatoplasty in the first and second postoperative day. Fairbanks [8] and Esclamado et al [9] have reported airway complications leading to death shortly after uvulopalatopharyngoplasty and associated procedures. The oral and maxillofacial surgeon who treats OSA patients must have a thorough understanding of the possible consequences and a complication avoidance strategy after surgery. Vigilance must be practiced.

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